

UNITED STATES MARINE CORPS
Logistics Operations School
Marine Corps Service Support Schools
PSC BOX 20041
Camp Lejeune, North Carolina 28542-0041

1312

STUDENT OUTLINE

EMBARKATION BOX AND PALLET PREPARATION

LEARNING OBJECTIVE(S):

1. Terminal Learning Objective: Given the requirement to move a unit, the applicable transportation assets, unit embarkation data, operations order, and the references, supervise a unit movement to ensure execution is completed within the required timeframe. (0402.04.02)

2. Enabling Learning Objectives:

a. Given the references, ensure that the equipment and cargo are prepared for embarkation in accordance with the references.

b. Given the references, employ publications and documents relating to Marine Corps equipment transportability to ensure compliance with the transportation asset being utilized.

c. Given the references, unit equipment and supplies prepared for embarkation, ensure equipment and supplies in boxes and warehouse pallets are constructed properly for transportation, in accordance with the reference.

d. Given unit equipment and supplies prepared for embarkation, inspect unitized cargo to ensure maximum economy of space is utilized and configuration supports mission requirements.

e. Given the references, unit equipment and supplies prepared for embarkation, ensure equipment and supplies is properly palletized on 463L Pallet in accordance with the reference.

OUTLINE

1. SOURCES OF EMBARKATION PREPARATION ASSISTANCE:

a. Higher Headquarters Embarkation Offices are usually some of the best sources for the who, what, where, why and when of preparation of supplies and equipment for embarkation. Normally, all requests for Packing, Packaging and Preservation (PP&P) (e.g., boxes, packing material, hazardous cargo certification, storage, etc.) are sent via the higher headquarters embarkation office. Sometimes the higher headquarters supply office is also involved.

b. Packing, Packaging and Preservation (PP&P) Section, Supply Bn, FSSG is the primary source of PP&P for the OF. The PP&P section is manned by both Marines and civilians. The Marines normally have the MOS 3052, Packing, Packaging and Preservation Specialist. A newly assigned embarkation officer/NCO should visit the PP&P section as soon as possible and find out the local procedures for obtaining PP&P support. Normally, the PP&P section can provide the following support:

(1) Builds containers (Boxes/Pallets) (Packaging)

(2) Packs containers [e.g., materials requiring special handling (fragile items, hazardous items, weapons, etc.)] (Packing)

(3) Certifies hazardous cargo (Every battalion/squadron and separate company sized unit should also have a certifier.)

(4) Prepares equipment for storage (Preservation)

c. Base/Station Transportation Management Officer (TMO) provides support similar to the PP&P section but primarily for the supporting establishment (e.g., base/station). There may be funding problems in using the base/station TMO. Again the newly assigned Embarkation Officer/NCO should visit the TMO to obtain details.

d. Air Mobility Command (AMC) Affiliated Tanker and Airlift Control Element (TALCE) provides guidance when you are moving by AMC aircraft. Each of major command (MEF, MarDiv, MAW, FSSG) is affiliated with a TALCE (i.e., McGuire, Travis, and Kadena AFB just to name a few).

The TALCE teaches the AMC Affiliation Program "Equipment Preparation Course" and "Load Planners Course." More details can be obtained from your higher headquarters embarkation office. Again, know your affiliated TALCE and make liaison long before it's time to move by AMC aircraft.

2. WAREHOUSE PALLETS

(a) 32" x 40" field warehouse pallet (MIL-P-3938B)

(1) Four-way entry

(2) Banding slots

(3) Stringers (LHA longitudinal conveyor compatible)

(4) Recessed separators (Sling compatible)

(5) Can be manhandled. Ideal for units that do not have organic MHE and will not normally be co-located with units that have MHE (e.g., infantry, combat engineers, etc.).

(6) Base for 30-32 cube pallet box

(7) Fits in all amphibious ship elevators, pallet conveyors and cargo stowage systems (e.g., Cargo Handling Equipment (CHE)).

(b) 40" x 48" Warehouse Pallet (MIL-P-3938B)

(1) Four-way entry

(2) Banding slots

(3) Stringers (LHA longitudinal conveyor compatible)

(4) Recessed separators (Sling compatible)

(5) Can not be easily manhandled. Ideal for units with MHE or that will be co-located with units with MHE (e.g., FSSG units, Division Headquarters, Wing units).

(6) Base for 48-50 cube pallet box

(7) Pallet boxes over 41" can be a problem when stacking two high in a ISO/ANSI container or over 48" when stacking two high on a 463L pallet.

(c) Cans banded to a pallet should:

(1) Have the spout side of the two outboard rows facing outboard (easy filling). Quite often the cans are embarked empty and are filled from the ship's tanks before they are sent ashore. Never place the cans too high on the pallet or you will not be able to fill the bottom, center row while the cans are banded to the pallet.

(2) Be sure the cans are flush with the short side of the pallet. This will reinforce the edge of the pallet where the lifting slings are inserted. A warehouse pallet with 21 full cans weighs 1000-1100 pounds and, a field warehouse pallet with 15 full cans weighs 750-850 pounds. This practice of flushing the sides of the pallet also causes the banding material to be flush. Use plywood, etc. (shims) as dunnage in the center of the pallet to get the cans flush with the sides of the pallet.

(d) Trucks and Trailers. Fits side-by-side on/in:

- MK48 with MK14/18 (LVS) (base of 12 and 2 high--24)
- M923/M925 and M813 (6X6) (base of 6 and 2 high--12)
- M927/M928 and M814 (6X6 extra long bed) (base of 8 and 2 high--16)
- M172/M870 (Low Beds) (primarily used for outsized cargo (heavy equipment)--but can carry pallets.
- M172-base of 12 pallets and 2 high--24
- M870-base of 16 pallets and 2 high--32 (You can even fit one or two on the goose neck).
- M929/M930 (Dump Truck) [primarily used for loose soil or rock but good for pallets, etc. during embarkation (base of 6 and one high--6.)]

(9) 20' ISO/ANSI Containers [Twenty Foot Equivalent Unit (TEU)]

- Uniform rows--base of 8 and 2 high--16
- Irregular rows--base of 9 and 2 high--18 Both only if height under 41"

(10) 463L USAF Pallet: Base of 4 and 2 high (8 total if height is 48" or less)

(11) Fits in all amphibious ship elevators, pallet conveyors and cargo stowage systems (e.g., cargo handling equipment (CHE)).

3. EMBARKATION BOXES

a. Pallet Box. The maximum height of a 48 - 50 cube pallet box should not normally exceed 41". Realistically, use a maximum height of 40" to allow a 1" error factor. This way they can be stacked two high in an ISO/ANSI container or on 463L pallets. The inside dimensions of a standard ISO/ANSI container (e.g., inside height and door lip) may vary but the normal inside dimensions is L = 231", W = 92" and H = 87" (not including the door lip). Pallet boxes stacked two high on 463L pallets can be up to 48" high (48" + 48" = 96").

b. Publications Box. There are various sizes of USMC publications boxes. One key is the length should not exceed 40". This way the box can be placed short-wise on a 40" x 48" pallet or long-wise on a 32" x 40" pallet without overhang. Normally, publications boxes are 40" x 15" x 15". Publications boxes are normally 5 to 6 cube. They are ideal for publications and pre-expended bins (PEB). Publication boxes can be stacked and banded to a pallet, or they can be stacked with all the open sides facing outboard for use as shelves.

c. Packing Concerns

(1) Liquids (Protect leaks with absorbents)

(2) Fragile items (Electronic equipment) (Use Labels)

(3) Commodity integrity (pack things that will be used together in the same container). Some examples are canteens with canteen covers or NBC suits with their gloves and booties. Watch out for hazardous cargo [e.g., Never pack fuzes or propellant with projectiles; blasting caps with C4 or TNT; NBC DS2 with Super Tropical Bleach (STB)].

(4) Packing Material:

- (a) Bubble Wrap (Cushioning)
- (b) Styrofoam (Cushioning)
- (c) Foam Rubber (Cushioning)
- (d) Cardboard, etc (Cushioning)
- (e) Vermiculite (Absorbent)
- (f) Desiccant (Dehumidifier) (Calcium Chloride)
- (g) Banding material (Binds together)

(5) Waterproofing Cargo. Waterproofing supplies and equipment can be accomplished using the following material:

- (a) Waterproof paper (glued to the inside of the box)
- (b) Plastic bags
- (c) Watertight inter containers (ammo cans, etc.)
- (d) Use watertight outer containers (Insert, PALCON, QUADCON, etc.)

(6) Waterproof items that are subject to water damage (e.g., paper items, electronic items, weapons, etc.).

(7) Do not waterproof items that are already waterproof or not subject to water damage (e.g., tentage, barb wire, etc.).

(8) When using plastic bags, desiccant may have to be used as a dehumidifier (sweat).

(9) Painting the exterior of embarkation boxes is a form of waterproofing/preservation for both the box's contents and the box. In a misunderstood cost saving effort, some embarkation SOP's do not require that all embarkation boxes be painted. The practice of not painting embarkation boxes does not save time and money in the long term. If you plan on using the box for what it is designed for "Embarkation", then paint it. It does not take long for a box to crack and warp if it is subject to the elements. Embarkation boxes that are going to be used for more than one deployment or are going to be stored outside should be painted with a heavy coat (by brush or roller) of USMC green paint. Spray painting embarkation boxes does not fill in the wood's pores like brush or roller painting. Basically the question to paint or not to paint must be decided by the unit based on the anticipated use of the box. An embarkation box should be painted. The cost* of boxes/pallets are:

50 cube box is \$93 (\$68 for material and \$25 for labor)

6 cube box is \$15.50 (\$12 for material and \$3.50 for labor)

40" x 48" MIL-P-3938B pallet is \$21 (System buy)

* Cost source is PP&P, 2d FSSG, Camp Lejeune, NC.

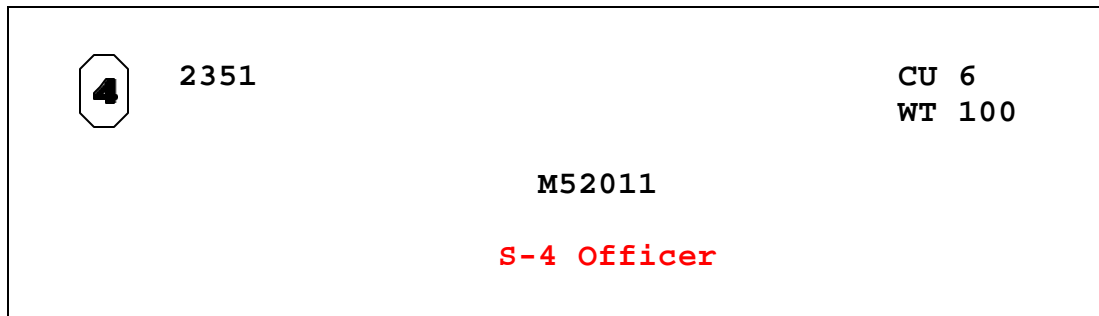
EXAMPLE. If a unit takes 100 unpainted 50 cube boxes on a deployment and the boxes are ruined, it will cost \$9300 to replace them. A gallon of Marine Corps green paint is about \$20 per gallon and you can paint about 4-50 cube boxes per gallon. You will need about 25 gallons of paint x \$20 per gallon is \$500. You already have the free labor in your units. Use Extra Police Duty (EPD) Marines. Painted boxes will last for many, many deployments. You would not leave the exterior of your house unpainted would you?

(10) Apply preservatives or rust preventives to those items subject to corrosion (e.g., weapons, field mess, etc.).

(11) Solution for solving packing problems is to use the pro's at PP&P.

c. Marking. Container (box/pallet) marking is not standard Marine Corps wide. Basically the information marked on the container is the same but the size and color of the marking varies between MARFORLANT and MARFORPAC. There is an ongoing initiative between MARFORLANT and MARFORPAC to standardize the marking procedures. The key is to read the local embarkation SOP (e.g., MARFORLANT/PAC, Division/Wing/FSSG SOP and Rgt/MAG/Bn Embarkation SOP).

EXAMPLE OF PROPERLY MARKED BOX



(1) Where. Containers (boxes) are marked on 3 sides. Pallets are also marked on 3 sides with 3 pallet boards (a pallet board is a piece of plywood approximately 12" x 12"). Pallets of bulk supplies (e.g., MRE, ammo, etc.) are not normally marked since they do not require a unique identification and are readily identifiable (All MRE pallets look and are alike. Ammo is marked with its DODIC and other information.).

(2) What. Containers (boxes/pallet boards) are marked with the following:

(a) Stowage Designator is a colored circle (normally 3" in diameter) painted in the upper left corner of the container (box/pallet board). The colors are:

Yellow: specifies cargo that must be accessible to unit personnel during the voyage; troop space cargo.

White: specifies unit equipment and supplies that must be on the same ship as the unit but need not be readily accessible during the voyage; hold stowed on the same ship as the owning unit.

(b) Unit Personnel and Tonnage Table Number (UP&TT#) is a number that identifies the supplies and equipment by type (e.g., general cargo, POL, ammunition, etc.). JP 3-02.2 provides a list of all UP&TT#s. UP&TT#'s are also found in MDSS II and CAEMS look-up tables and Users Manuals. The UP&TT# is painted inside the stowage designator circle.

(c) Box/Pallet Number. The box#/pal# is a unique number assigned to each box/pallet. Normally each battalion and squadron size unit issues blocks of box/pallet numbers to its units (e.g., companies, sections and platoons). Check your local Embarkation SOP. The box number is painted directly to the right of the stowage designator. When a piece of equipment has a serial number, the entire serial number is used in MDSS II and CAEMS. In the past (SEMS) only the last four digits of the serial number were used in lieu of the box number.

- In the case of bulk supplies the box/pallet number is not marked on box/container (e.g., MRE, barb wire, etc.) since each box/pallet does not require a unique identification. In MDSS II a box/pallet number (package ID) must be entered or the system will generate one automatically.

(d) Cube and Weight. The cube and weight, rounded to the next whole number, is painted in the right corner of the container (box/pallet board).

- Cube. The cube is arrived at by multiplying the container's length, width and height, in whole numbers, and dividing by 1728 (12 x 12 x 12). Then round the answer to the next whole cubic foot. When measuring a container, it is common practice to always round up to the next whole inch.

A container that is 40 7/8" today may be 41 1/8" tomorrow. Wooden containers expand and shrink with the weather and/or the nails loosen when the container is moved around. A normal rule-of-thumb for inspections is to allow an error factor of plus or minus one inch.

- Weight. The weight is arrived at by actually weighing the container with all of its contents or by using a standard weight for all containers of the same size and cube. If scales are not available, estimating the weight is better than nothing.

(e) Unit Identification Code. Each Force Commander (MARFORLANT/PAC) will be utilize their respective BN/SQDN level UIC/RUC's listed in MCO P1080.20_, preceded by the letter "M". This marking will be placed on embarkation containers and all equipment. Use of UIC/RUC's below the BN/SQDN level is not authorized unless specifcally approved by MARFORPAC/MARFORLANT. For battle field security reasons this number is always painted in black (painting the number black does not totally hide the number but makes it harder for the enemy to quickly identify the owning unit). This is especially true when the enemy is trying to identify the owning units of vehicles in a convoy.

(f) Special Markings are sometimes used for administrative purposes.

(g) Logistics Applications for Marking and Reading of Symbols (LOGMARS). LOGMARS uses a bar code and an optical scanner. Then the data the scanner reads is input into a computer (e.g., MDSS II and TC-AIMS). The Marine Corps is already using LOGMARS in the Fleet Marine Force, however, a majority of the labels used today are on vehicles. The MEF's are in the process of issuing the equipment and material necessary to allow the labels to be placed on all cargo, containers and equipment. LOGMARS applications may range from armory management to accounting for supplies and of course accounting for cargo and people being transported. Soon you may see a bar code on your ID cards. Consult your local embarkation SOP for proper Bar Code label placement.

4. 463L PALLET SYSTEM

a. Dual-Rail System. The dual-rail system is installed in all AMC cargo aircraft (i.e. C-130, C141, C-17 and C-5). This system consists of two side rail guides and four rows of rollers.

(1) The rollers allow for the ease of loading/unloading of palletized cargo.

(2) The side rail guides direct the pallets into the aircraft and provide lateral and vertical restraint (see figure 1, note 2). The side rails have detent locks that hold the pallet securely, preventing the forward and aft movement during flight.

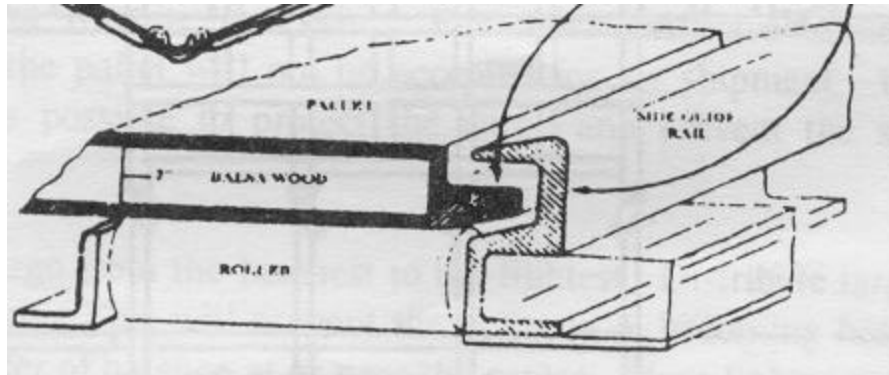


Figure 1

b. 463L Pallet Construction. The 463L pallet is made of corrosion resistant aluminum with a soft wood core framed on all sides by aluminum rails (see figure 1, note 1). These rails have 22 rings attached, six rings on each long side and five rings on each short side. The rails also have indents (notches) to accept the detent locks.

(1) Dimensions. The overall dimensions of the 463L pallet are 108 inches wide by 88 inches long by 2-1/4 inches thick (see figure 1). However, the **usable** dimensions are 104 inches wide and 84 inches long. This allows 2 inches around the pallet for attaching nets, straps, or other restraint devices.

(2) Weight. An empty 463L pallet weighs 290 pounds (355 pounds with the nets) and has a maximum netted load capacity of 10,000 pounds.

c. 463L Pallet Nets. There are three nets to a set; one top net and two side nets (see figure 2). A complete set of nets weighs 65 pounds and will provide adequate restraint for 10,000 pounds of cargo when properly attached.

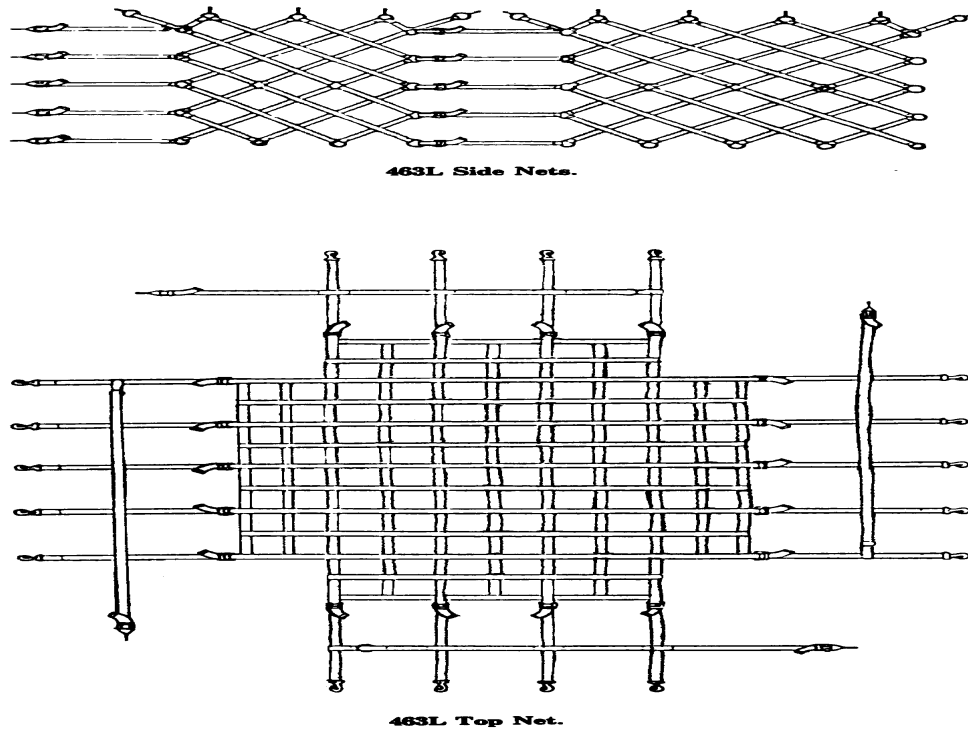


Figure 2

(1) Side nets. The side nets are green in color and attaches to the rings of the 463L pallet. When attaching the side nets to the corner of the pallet, ensure to cross the straps (see figure 3).

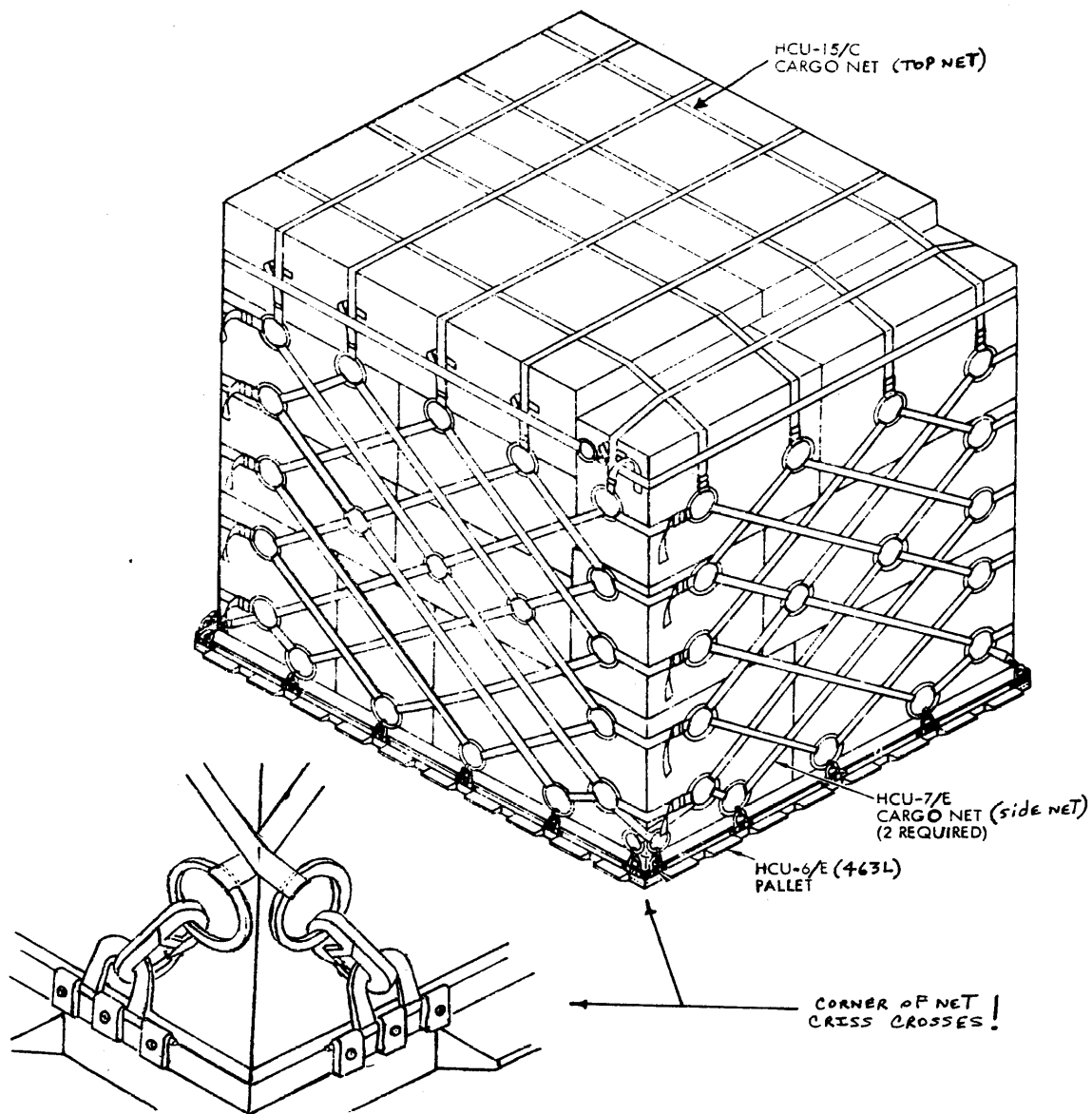


Figure 3

(2) Top net. The top net is yellow in color and is attached by hooks to the side nets. The top net can be used without the side nets depending on the height of the cargo.

d. DUNNAGE REQUIREMENTS. Always put adequate dunnage under 463L pallets by using a minimum of three 4" X 4" pieces 88 inches long. Always send the dunnage with the pallet to ensure there is proper dunnage at the destination.

e. PALLET BUILD-UP. Always use the common sense approach when building the 463L pallet.

(1) Palletize cargo from the heaviest to the lightest. Distribute the large and heavy items evenly from the center of the pallet outward.

(2) The maximum height when building a 463L pallet is 96 inches. When measuring the pallet, all measurements are taken from the top of the pallet to the highest point of the cargo.

f. Married Pallets. When cargo exceeds the usable dimensions of the 463L pallet, two or more pallets may be joined by using pallet spacers (see figure 4). The spacers are used to keep the married pallets aligned and properly spaced so they will lock into the rail systems of the aircraft.

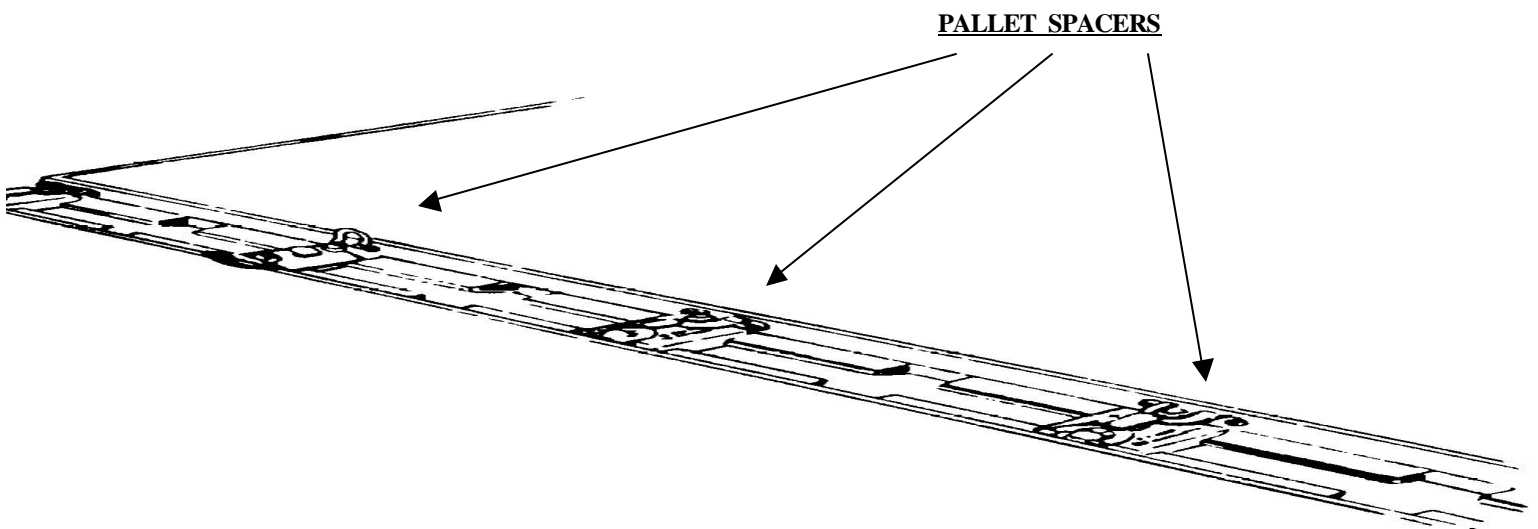


Figure 4

g. Weighing and Marking of the 463L pallet. Each pallet built must be weighed and marked prior to loading. The 463L pallet can be weighed by placing the pallet on a fixed scale or by using two portable scales.

(1) Since all dunnage will be sent with the pallet, ensure to include it when weighing the 463L pallet.

(2) Once the pallet has been weighed, the weight must be marked on one 88 inch side and on one 108 inch side of the pallet.